ZB-2550(P)/ZB-2551(P)

User Manual

Warranty

All products manufactured by ICP DAS are under warranty regarding defective materials for a period of one year, beginning from the date of delivery to the original purchaser.

Warning!

ICP DAS assumes no liability for any damage resulting from the use of this product. ICP DAS reserves the right to change this manual at any time without notice. The information furnished by ICP DAS is believed to be accurate and reliable. However, no responsibility is assumed by ICP DAS for its use, not for any infringements of patents or other rights of third parties resulting from its use.

Copyright

Copyright @ 2007 by ICP DAS Co., Ltd. All rights are reserved.

Trademark

The names used for identification only may be registered trademarks of their respective companies.

Table of Contents

1. Introduction 3

1.1 More Information 4

1.2 Pin Assignment 6

1.3 Specifications 7

1.4 Block Diagram 9

1.5 Wire Connection 10

1.6 Quick Start 12

Zigbee Addressing and Identifiers 16

1.7 Default Settings 17

2. Applications 18

2.1 Operating Modes 18

Operating Mode 18

2.2 Application Example 20

Operating Mode 1 : Transparent 20

Operating Mode 2 : Packet 21

Operating Mode 3 : Packet- Addressable 22

2.3 ZigBee Network Groups 23

1. Introduction

ZigBee is a specification based on the IEEE 802.15.4 standard for wireless personal area networks (WPANs). ZigBee operates in the ISM radio bands and its focus is to define a general-purpose, inexpensive, self-organizing, mesh network that can be used for industrial control, embedded sensing, medical data collection, smoke and intruder warning, building automation, home automation, and domotics, etc.

At present, the ICP DAS ZigBee converter ZB-2550 and ZB-2551, supports the RS-232 and RS-485 interfaces. The main design goal is limited data communication using wireless transmission, so may provide a better solution for environments where wiring is difficult.

1.1 More Information

The ZB-2550 and the ZB-2551 are small-sized wireless ZigBee converters based on the IEEE 802.15.4 standard. They allow RS-485/RS-232 interfaces to be converted to a ZigBee wireless network. Only one ZB-2550 (Host) is allowed in a ZigBee network and is used to initialize and manage the data transmission routes. The ZB-2551 (Slave) ZigBee router is responsible for transmitting/receiving data from its child/parent router or the host. ICP DAS ZigBee products are designed for low data rates. The main benefit of ICP DAS ZigBee products is that they can be used to define a general-purpose, self-organizing mesh network, which can be highly advantageous for industrial control.

The typical transmission range of the ICP DAS Zigbee ZB-2550/ZB-2551 converter is 100m, and the ZB-2550P/ZB-2551P is 700m.

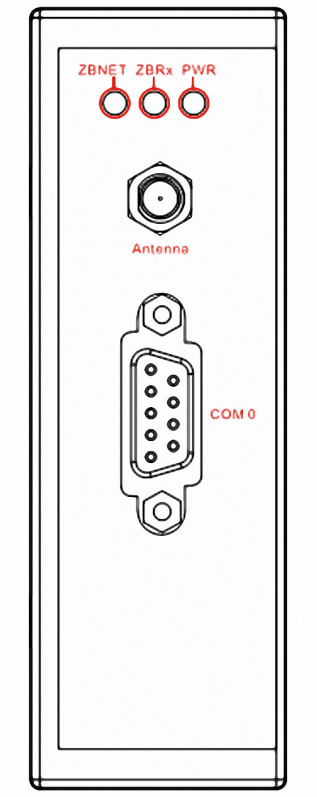
The transmission frequency range of the ZigBee converter is between 2.405 GHz and 2.48 GHz, separated into 5 MHz sectors, and provides 16 channels, and 65536 Pan IDs (65535 network groups can be set).

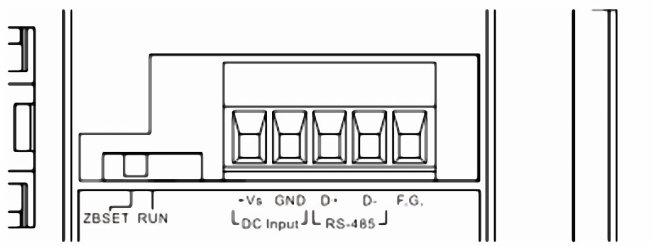
The ZigBee converter includes a repeater module that can be used to increase communication range or prevent data loss if the connection is interrupted or becomes unstable. Please refer to ZigBee converter other document for more information as following links:

http://ftp.icpdas.com/pub/cd/usbcd/napdos/zigbee/zigbee_converter/

1.2 Pin Assignment

ZB-2050(P)/ZB-2051(P)





1.3 Specifications

Models	ZB-2550	ZB-2550P	ZB-2551	ZB-2551P
Wireless				
RF channels	16			
Receive sensitivity	-102 dBm			
Transmit power	12 dBm			
Network Topology support	Star, Mesh and Cluster tree			
Certification	TUV(ZCP)			
Antenna	2.4GHz - 3dBi Omni-Directional antenna			
Transmission Range	100m	700m	100m	700m

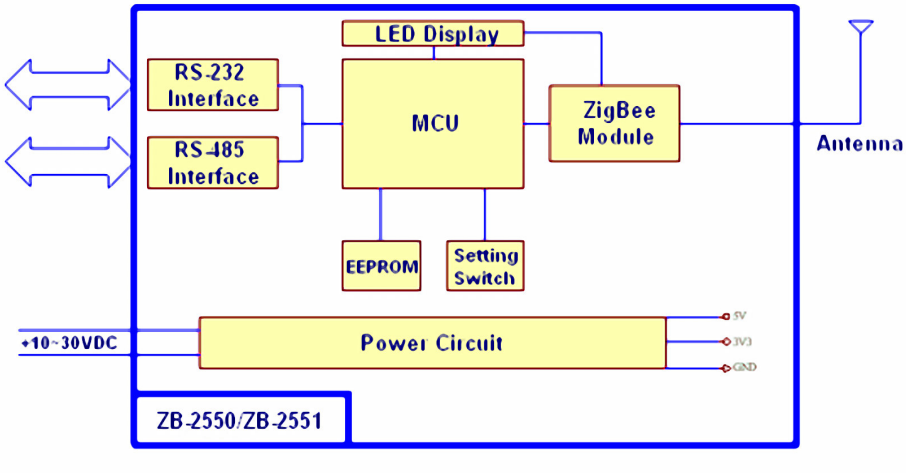
Models	ZB-2550	ZB-2550P	ZB-2551	ZB-2551P
General				
CPU	8-bit microcontroller			
EEPROM	128 KB (8 blocks, each block has 256 bytes);Data retention > 40 years; 1,000,000 erase/write cycles			
Module Type	Host	Host	Slave	Slave
Communication Interface				
COM 0	RS-232 (TXD, RXD and GND); D-SUB9 Female, Non-isolated		RS-232 (TXD, RXD and GND); D-SUB9 Male, Non-isolated	
	RS-485 (D+, D-; internal ASIC self-tuner); Non-isolated			
COM 0 Settings				
Data Bit	8			
Parity	Even, Odd, None			
Stop Bit	1, 2			

LED Indicators	
ZigBee Net State	Green
ZigBee RxD	Yellow
Power	Red

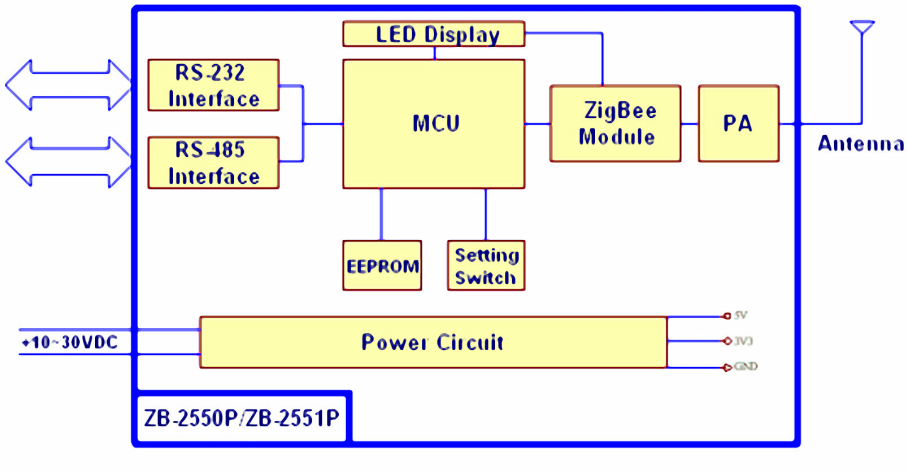
Models	ZB-2550	ZB-2550P	ZB-2551	ZB-2551P
Power				
Protection	Power reverse polarity protection			
EMS Protection	ESD, Surge, EFT			
Required Supply Voltage	+10 VDC ~ +30 VDC			
Power Consumption	0.5W	2W (max)	0.5W	2W (max)
Connection	5-Pin 5.08 mm Removable Terminal Block			
Mechanical				
Casing	Plastic			
Flammability	UL 94V-0 materials			
Dimensions	33 mm x 78 mm x 107 mm (W x L x H)			
Installation	DIN-Rail			
Environment				
Operating Temperature	-25 °C ~ +75 °C			
Storage Temperature	-40 °C ~ +80 °C			
Relative Humidity	5 ~ 95% RH, non-condensing			

1.4 Block Diagram

ZB-2050/ZB-2551



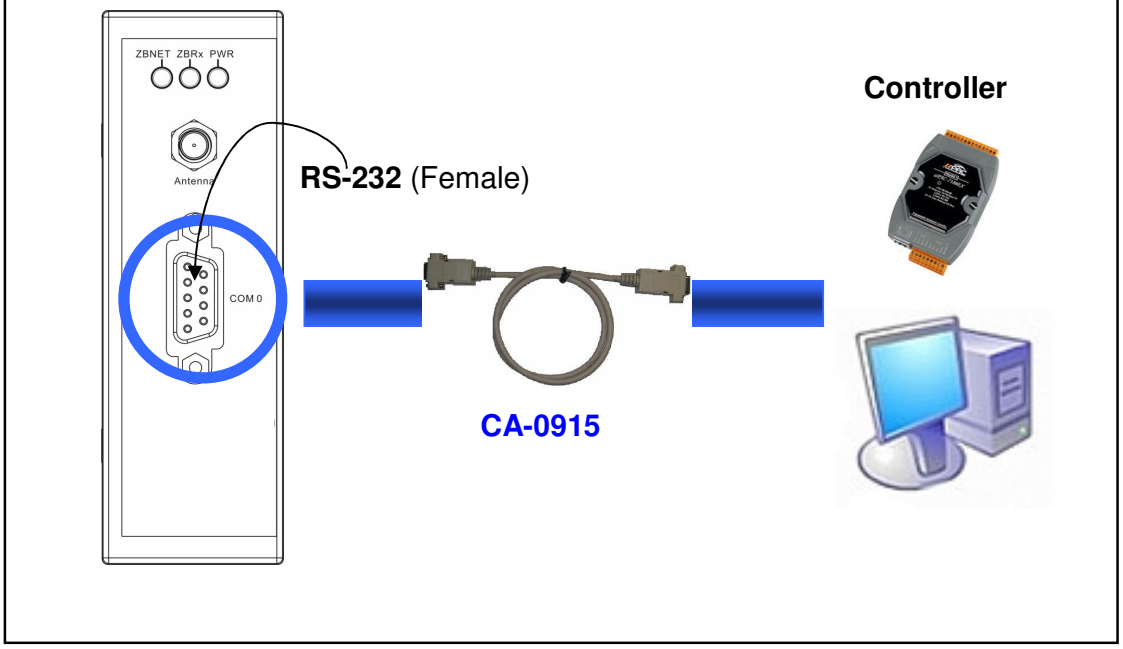
ZB-2050P/ZB-2551P



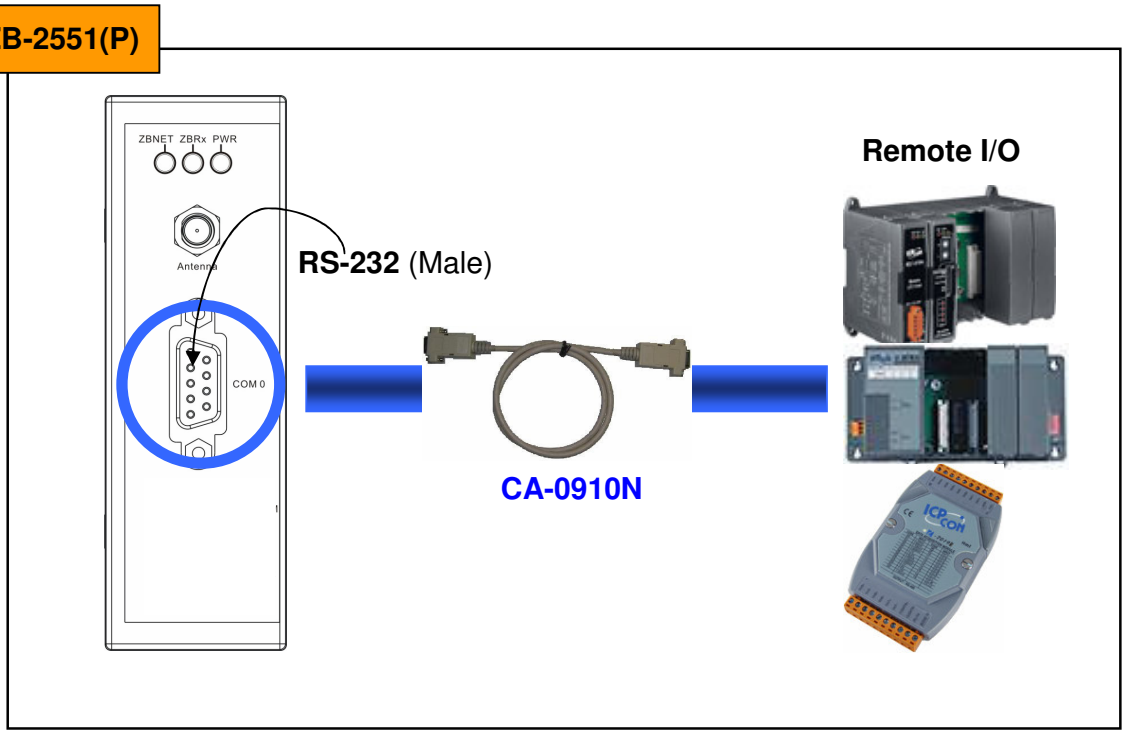
1.5 Wire Connection

Serial Port - RS-232

ZB-2550(P)

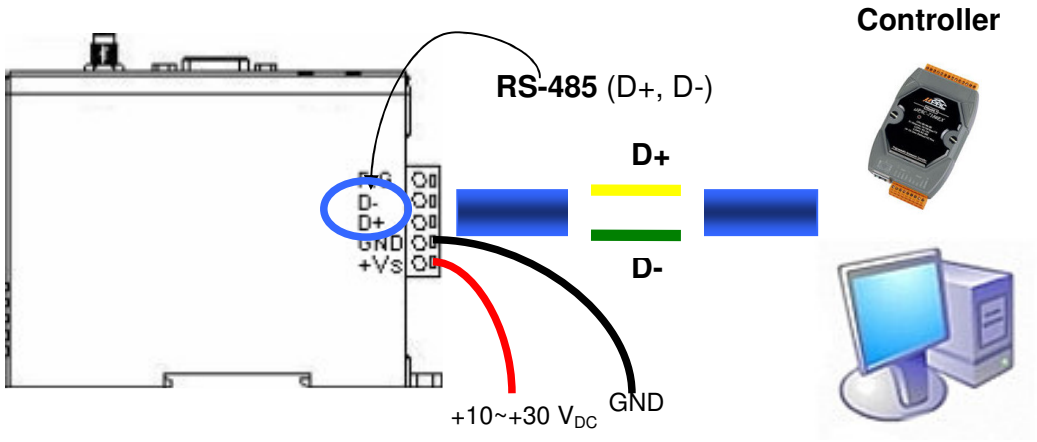


ZB-2551(P)

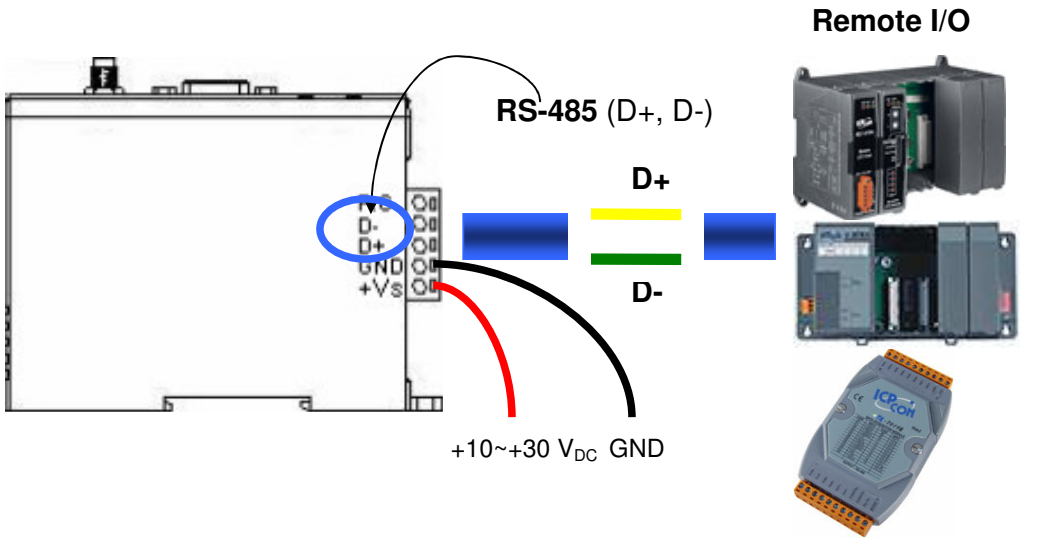


Serial Port - RS-485

ZB-2550(P)

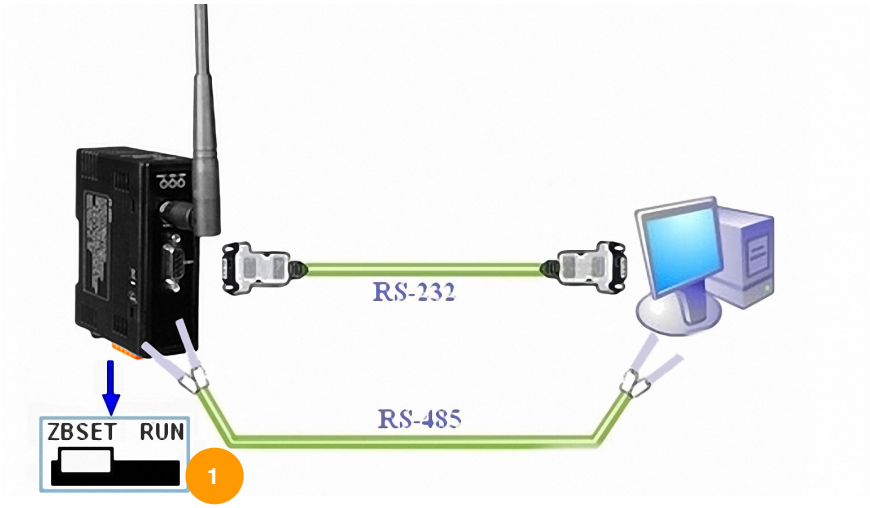


ZB-2551(P)

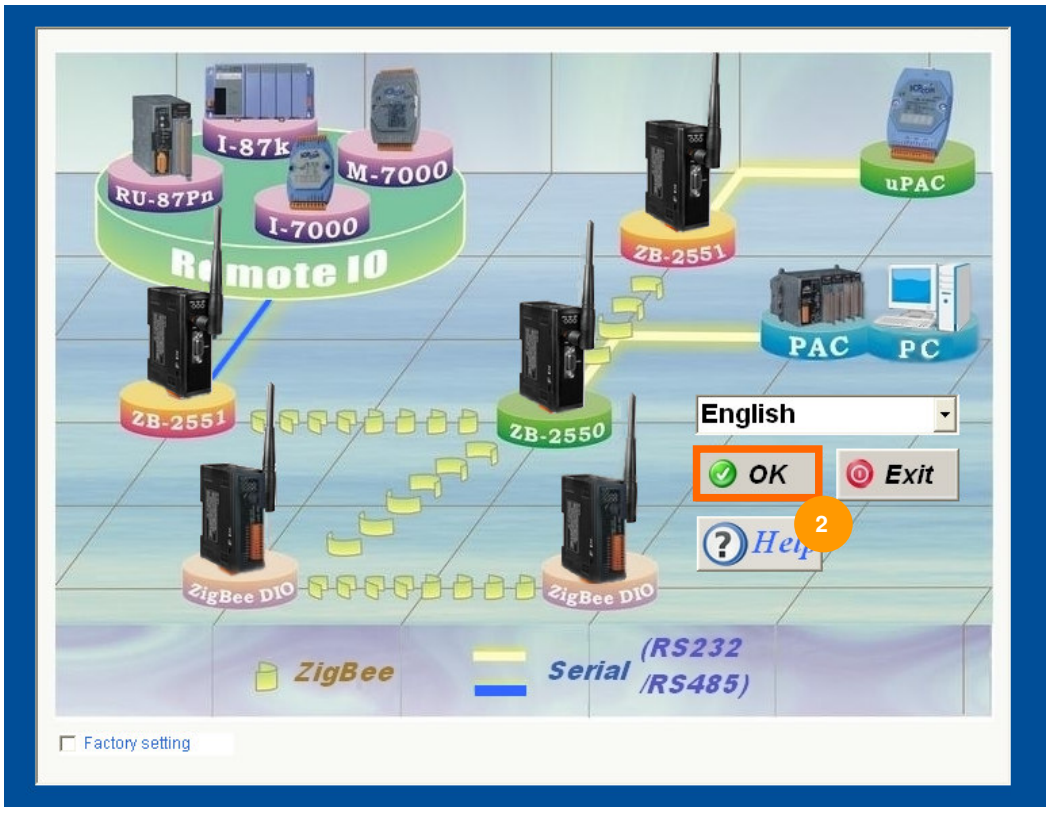


1.6 Quick Start

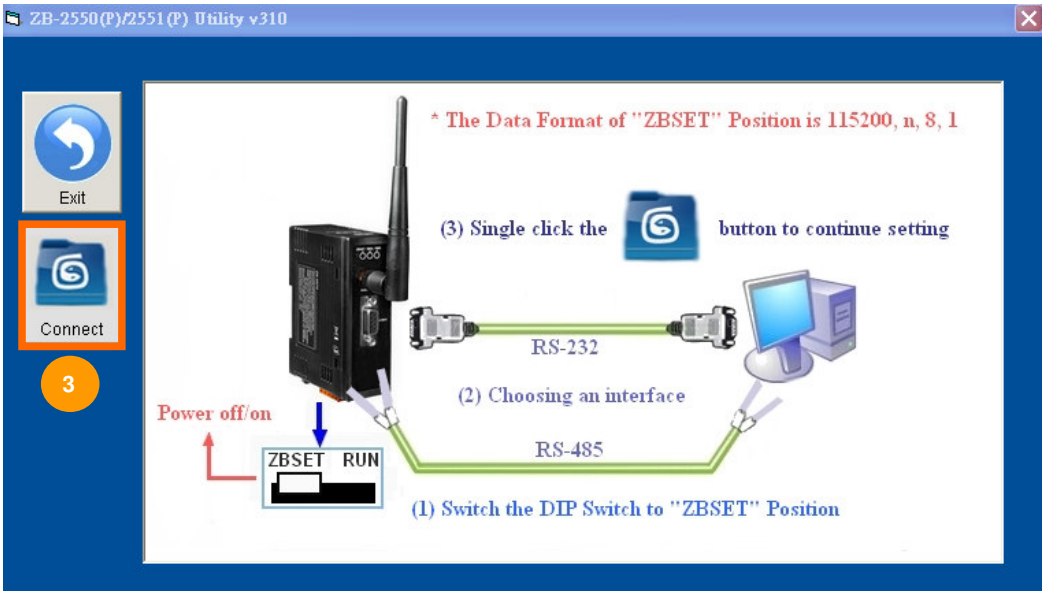
1. Before configuring the ZigBee converter, adjust the switch to the ZBSET position then re-boot (power off/on) the module. After configuration is complete, adjust the switch to the RUN position then re-boot (power off/on) the module.



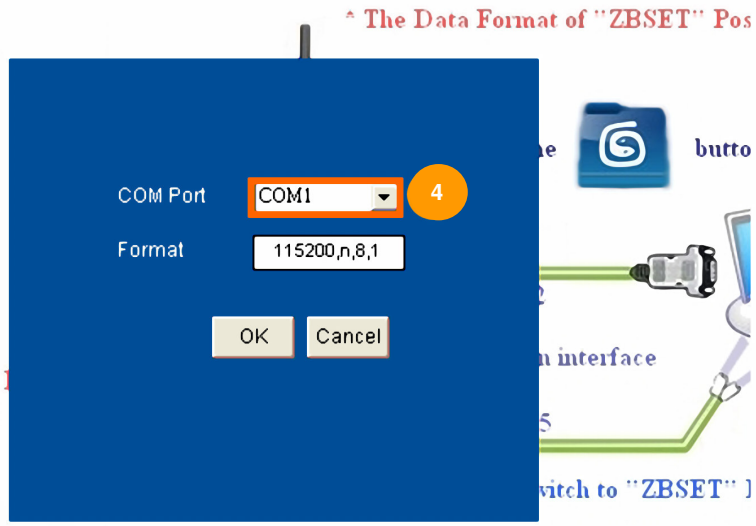
2. When the following screen is displayed, click on the OK button



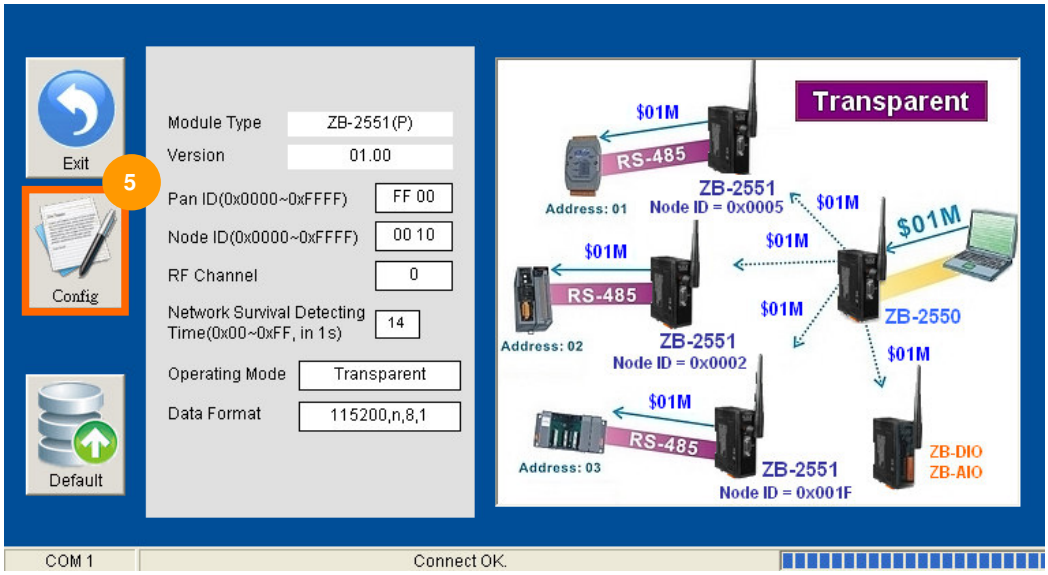
3. Click on the Connect button



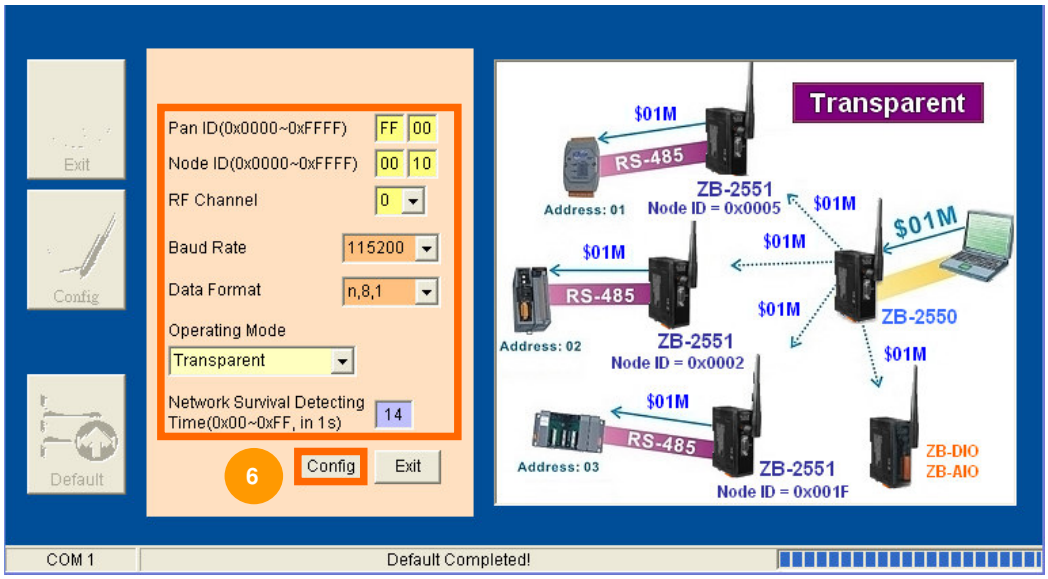
4. Please select the COM Port on your PC



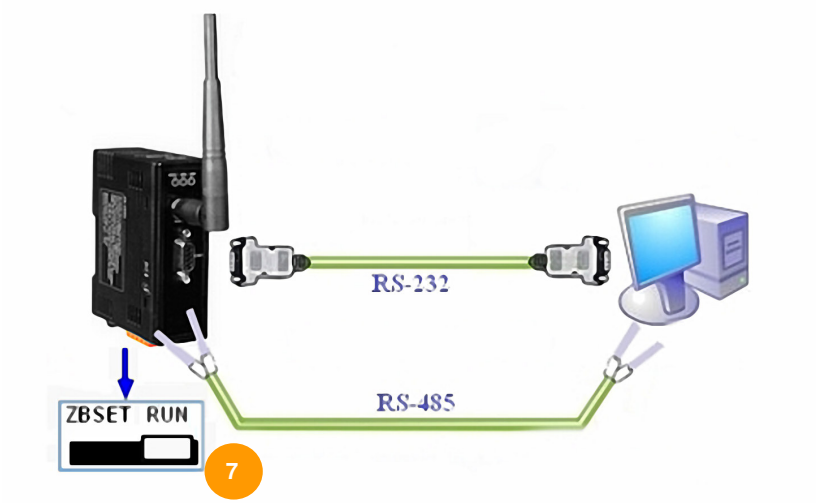
5. Click on the Config button to configure setting for the ZigBee Converter - ZB-2550(P)/ZB-2551(P). e.g : ZB-2551(P)



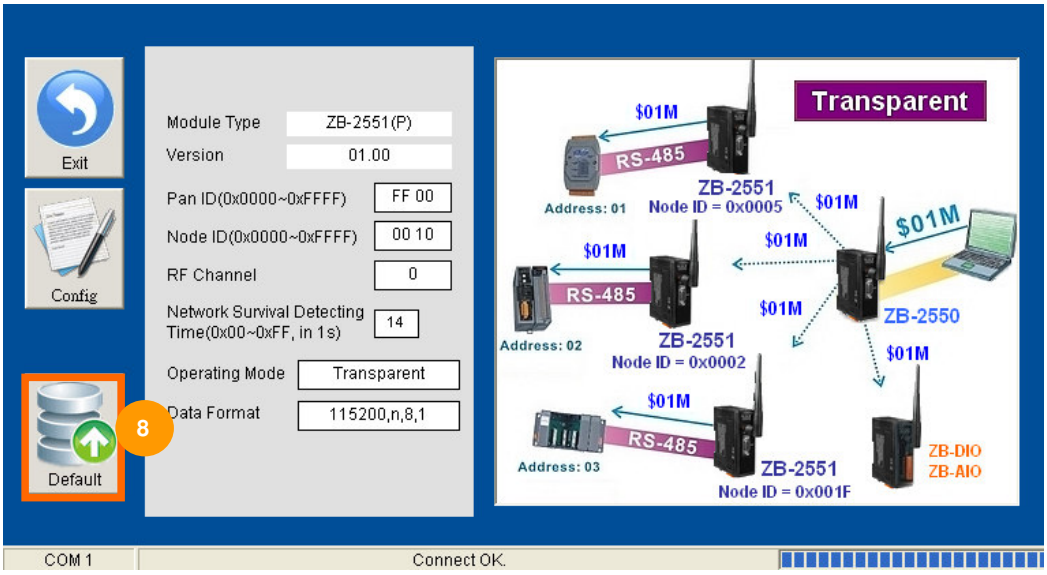
6. Click on the Config button for set the new ZigBee setting.



7. After ZigBee module configuration has been successfully established. Now, adjust the switch to the RUN position then re-boot (power off/on) the module. Leverage the power of your data. Make it work for you.



8. Click Default button to load factory default parameters if you want to load factory default setting of ZigBee Module



Zigbee Addressing and Identifiers

- **Node ID (0x0000~0xFFFF)**
  A 16-bit address that describes a Zigbee node
  Randomly assigned during network join
  ZB-2570(P)/ZB-2550(P) always uses 0x0000
  ZB-2571(P)/ZB-2551(P) ranges 0x0001~0xFFFF
  ZB-DIO/ZB-AIO ranges 0x0001~0x001F
  Resolve by stack in case of collision
  Included in all message to identify node

- **Pan ID (0x0000~0xFFFF)**
  A 16-bit ID to identify the network
  Included in every packet
  A "logical" way to separate Zigbee networks running on same RF channel
  Defined during network formation by ZB-2570(P)/ZB-2550(P)
  ZB-DIO/ZB-AIO always uses 0xFF00 or 0xFF01

- **RF Channel**
  1 of 16 RF channels
  Defined during network formation by ZB-2570(P)/ZB-2550(P)

Note : A Work Network - Runing on the same Pan ID and RF Channel

- **Network Survival Detecting Time**
  ZB-2551(P) will connect with Parent (ZB-2550(P)) periodically to confirm the survival of network. If it detects unsuccessfully, and it process initialize network again to find a new parent.

1.7 Default Settings

Default settings for the ZB-2550 are as follows：

ZB Node ID：	0x0000
ZB Pan ID：	0xFF00
ZB Channel (RF Channel)：	0x00
ZBSET Data Format：	115200,n,8,1
Operating Mode：	Transparent

Default settings for the ZB-2551 are as follows：

ZB Node ID：	0x0020
ZB Pan ID：	0xFF00
ZB Channel (RF Channel)：	0x00
ZBSET Data Format：	115200,n,8,1
Operating Mode：	Transparent
Network Survival Detecting Time：	20 second (0x14)

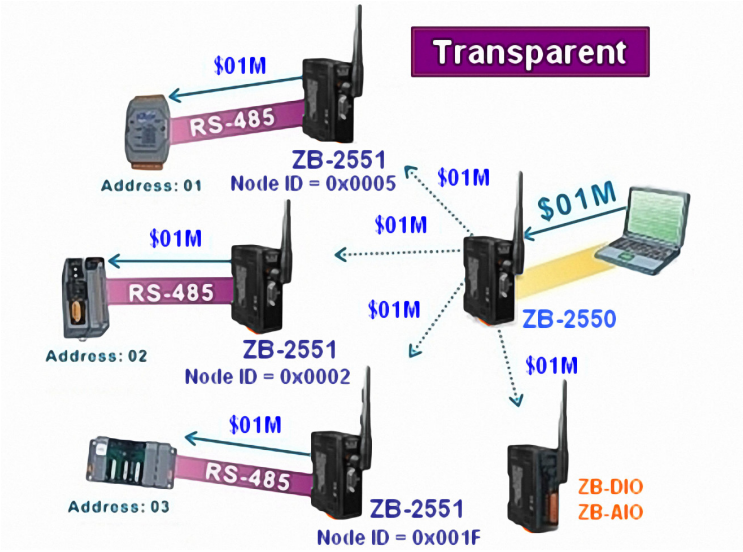
2. Applications

2.1 Operating Modes

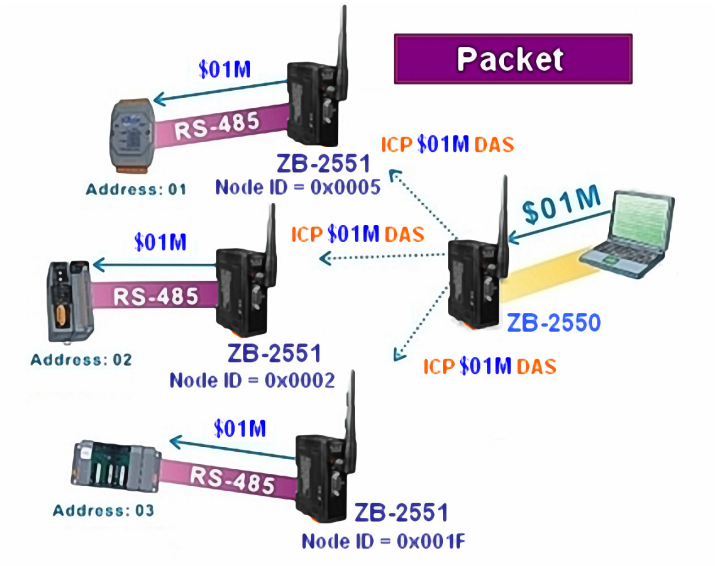
Interface	Operating Modes	
Serial Port (RS-232/RS-485)	Operating Mode 1	**Transparent**
	Operating Mode 2	**Packet**
	Operating Mode 3	**Packet- Addressable**

Operating Mode

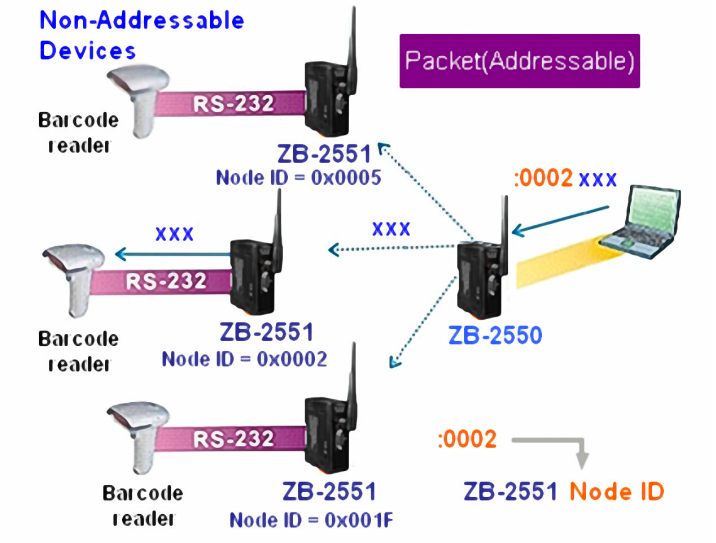
- **Transparent (Original packet will be broken down into many small packets, each small packet is 50 Byte)**
  Transparent mode lets you use the ZB-2550(P)/ZB-2551(P) module like a router. (Maximum original packet size is 200 Byte. Original packet must not more than 200 Byte, e.g "$01M" = 4 Byte)



- **Packet(Original packet won't be broken down into small packets)**
  Bring original packet into a ICP DAS packet. The size of a ICP DAS packet is 200Byte. (Maximum original packet size is 200 Byte.)



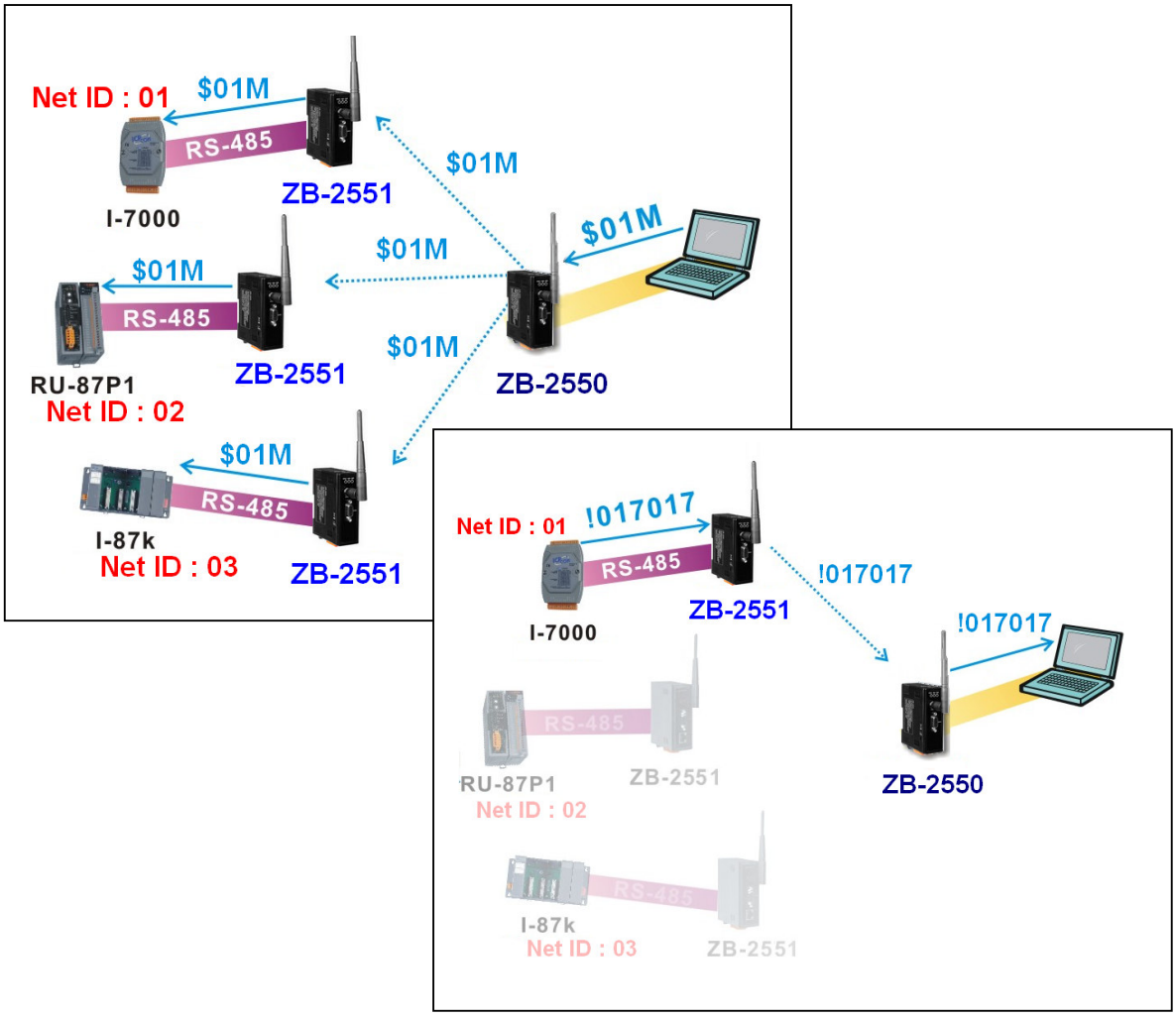
- **Packet-Addressable**
  (Original packet won't be broken down into small packets)
  For Non-Addressable Device, such as barcode reader.
  Syntax, **:ADDRxxx** , the **ADDR** is your ZB-2551(P) Node ID.
  (Maximum original packet size is 200 Byte. Original packet must not more than 200 Byte, e.g "xxx" = 3 Byte)



2.2 Application Example

Operating Mode 1 : Transparent

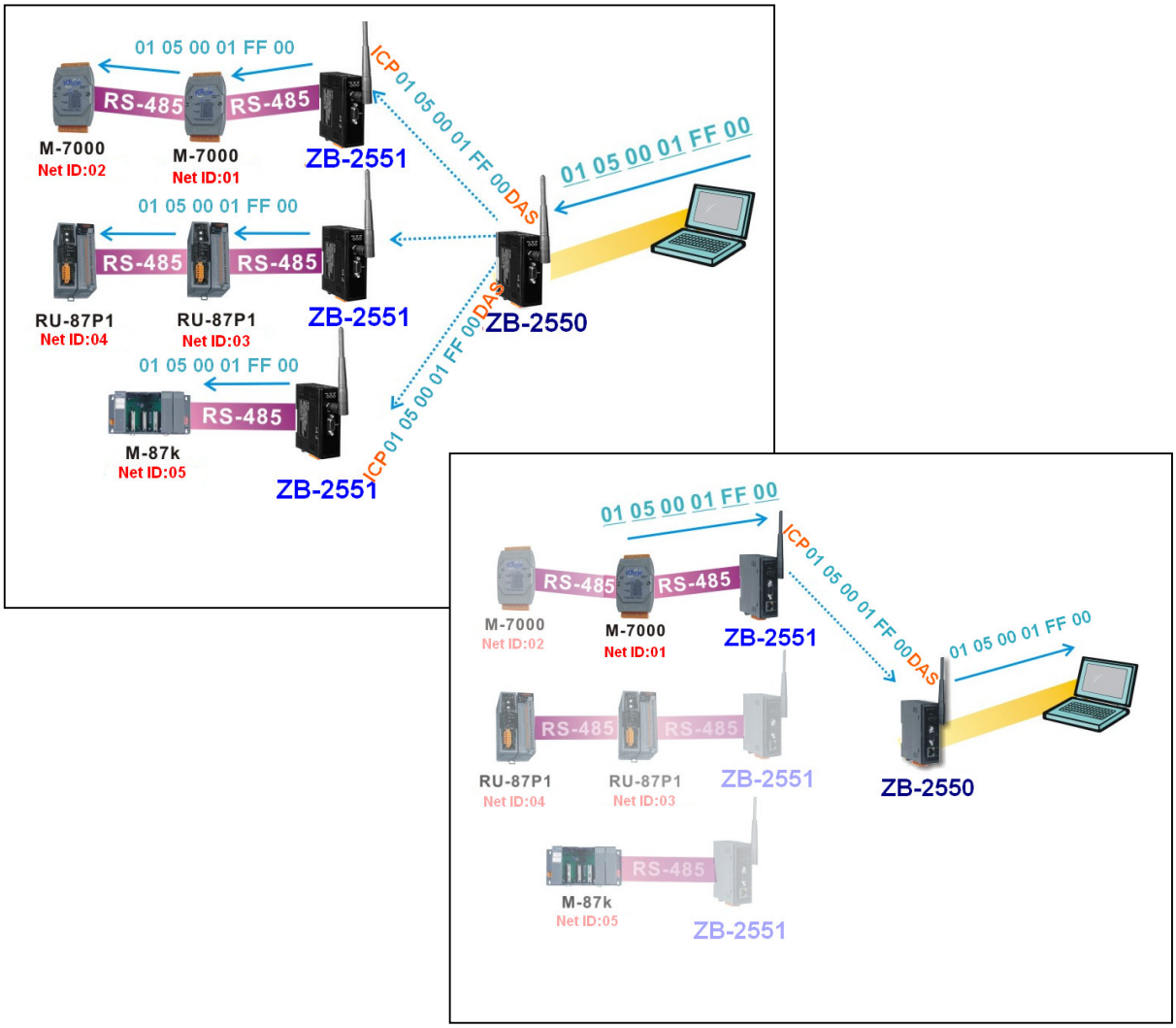
If you wish to convert the RS-232/RS-485 interface to ZigBee and the device is addressable, such as the ICPDAS I-7000/M-7000/I-87k remote I/O modules, you can use the ZB-2551 (slave) to connect to these I/O modules and use the ZB-2550 (host) to connect to your controller or PC. If original packet size is **less than 50 Byte most of the time**, this Mode is the most suitable.



In some applications where the host controller needs to broadcast data to all RS-232/RS-485 devices and these devices receive data only (no response), you can also use this mode.

Operating Mode 2 : Packet

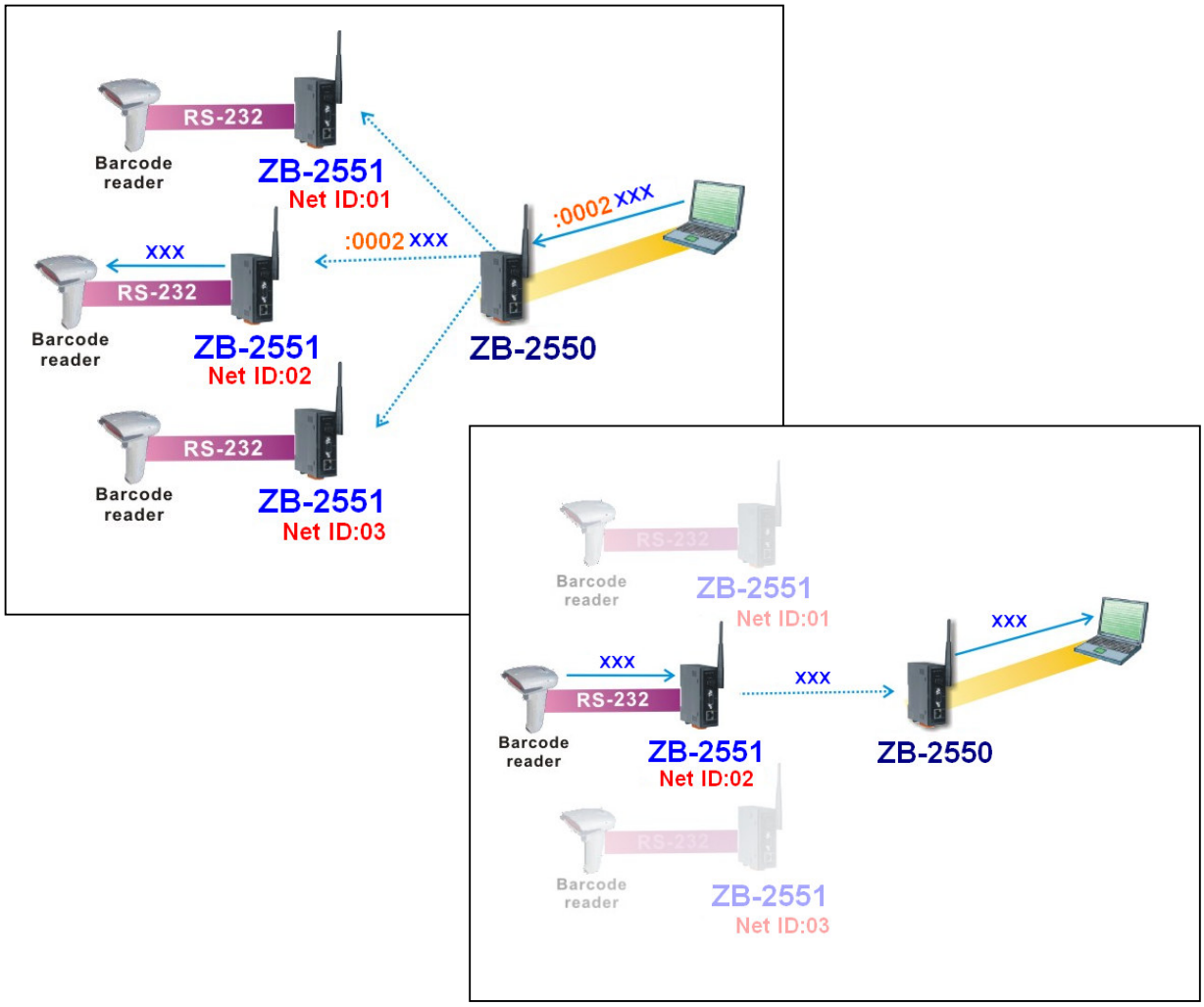
If you wish to convert the RS-232/RS-485 interface to ZigBee and the device is addressable, such as the ICPDAS I-7000/M-7000/I-87k remote I/O modules, you can use the ZB-2551 (slave) to connect to these I/O modules and use the ZB-2550 (host) to connect to your controller or PC. If original packet size is **greater than 50 Byte most of the time**, this Mode is the most suitable.



In some applications where the host controller needs to broadcast data to all RS-232/RS-485 devices and these devices receive data only (no response), you can also use this mode.

Operating Mode 3 : Packet- Addressable

If the RS-232/RS-485 interface modules aren't addressable. Add 5 ASCII characters to the header of the original request data from your controller, then the remote device with the correct address will respond to it. This mode is similar to that used in ICPDAS I-752N products.

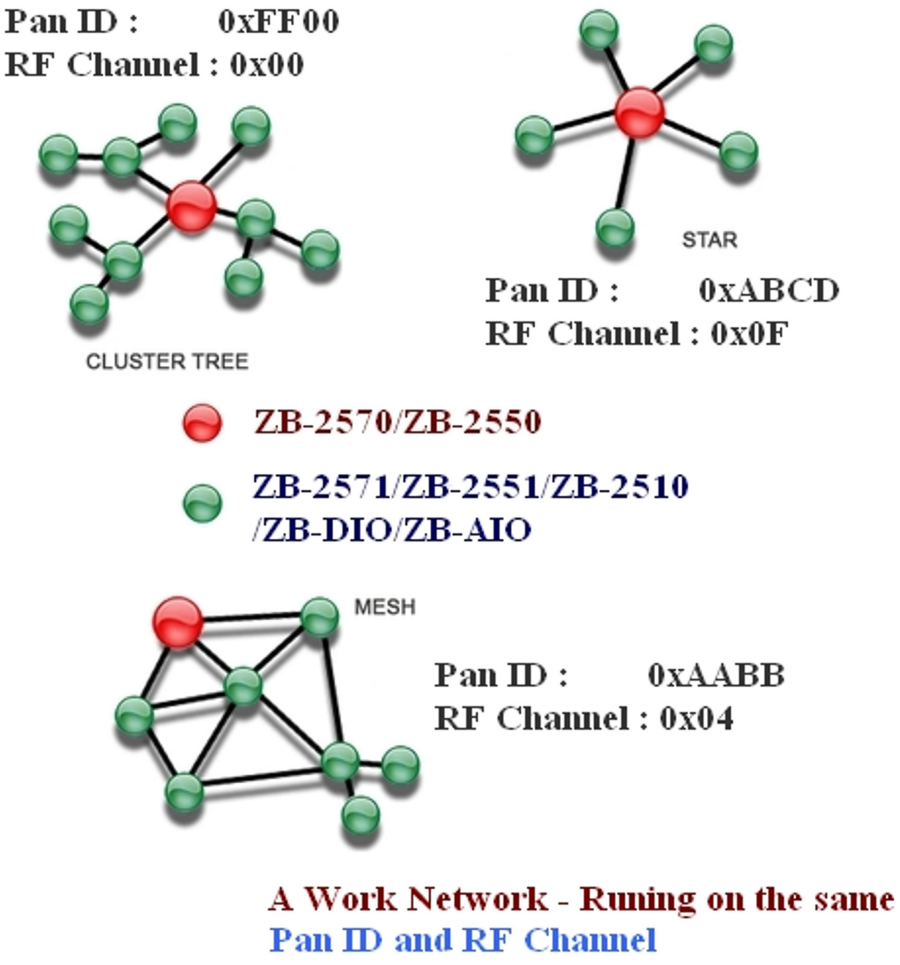


Syntax:

:ADDRxxx

:	Delimiter character
ADDR	The ADDR is your ZB-2551(P) Node ID
xxx	xxx is your original packet

2.3 ZigBee Network Groups



Original packet > 50 Byte => No Delay

Original packet > 50~100 Byte => Delay 50ms

Original packet > 100~150 Byte => Delay 100ms

Original packet > 150~200 Byte => Delay 150ms

Original packet > 200 Byte => N/A

If original packet size is greater than 50 Byte most of the time, Operating Mode Packet is the most suitable.

If you want to transmit more than 200Byte one packet and high-speed rate, please order a advanced ZigBee Converter ZB-2570 and ZB-2571

ZB-2550

ZB-2551

If original packet size is **less than 50 Byte most of the time**, **Operating Mode Transparent** is the most suitable.

If original packet size is **greater than 50 Byte most of the time**, **Operating Mode Packet** is the most suitable.

If you want to transmit more than **200 Byte one Packet** or high-speed rate, please order a advanced ZigBee Converter ZB-2570 and ZB-2571

- **Technical Support**

  If you have problems about using the ZB-2000 series modules, please contact ICP DAS Product Support.
  Email: Service@icpdas.com